I CLAIM:

- 1. An IC fabrication-compatible spiral inductor, comprising
- a) the inductor having stacked planar coils made from a plurality of spaced conductive layers,
- b) the stacked planar coils being electrically connected by coil connectors;
- c) a magnetic core comprising stacked and aligned magnetic elements between the plurality of spaced conductive layers and being located within the stacked planar coils and extending between the spaced metal layers.
- 2. The inductor of Claim 1 wherein the magnetic element materials are compatible with at least one of CMOS or BiCMOS fabrication technology.
- 3. The IC fabrication-compatible spiral inductor of Claim 1 wherein the magnetic elements comprise electrically conductive and magnetic material.
- 4. The IC fabrication-compatible spiral inductor of Claim 1 wherein the coil connectors comprise the same material as the magnetic elements.
- 5. The IC fabrication-compatible spiral inductor of Claim 4 wherein the magnetic core comprises an array of magnetic element bars within the magnetic core.

- 6. The inductor according to Claim 5, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 7. The inductor according to Claim 4, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 8. The IC fabrication-compatible spiral inductor of Claim 1 wherein the magnetic core comprises an array of magnetic element bars within the magnetic core.
- 9. The inductor according to Claim 8, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 10. The inductor according to Claim 1, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 11. The inductor of Claim 1 wherein the inductor has a footprint dimension of about 75μm x 75μm or less.
- 12. The inductor of Claim 1 wherein the inductor is a 10nH inductor with a footprint dimension of less than 25μm x 25μm in a 0.18μm six layer metal interconnect copper CMOS technology.

- 13. A single chip IC comprising:
- a) a core circuit electrically connected to an inductor;
- b) the inductor having stacked planar coils made from a plurality of spaced layers comprising electrically conductive material,
- c) the stacked planar coils being electrically connected by coil connectors;
- d) the stacked planar coils having a magnetic core comprising stacked and aligned magnetic elements between the plurality of spaced layers and being located within the stacked planar coils.
- 14. The single chip IC of Claim 13 wherein the magnetic element materials are compatible with at least one of CMOS or BiCMOS fabrication technology.
- 15. The single chip IC of Claim 13 wherein the magnetic elements comprise electrically conductive and magnetic material.
- 16. The single chip IC of Claim 15 wherein the coil connectors comprise the same material as the magnetic elements.
- 17. The single chip IC of Claim 16 wherein the magnetic core comprises an array of magnetic element bars within the magnetic core.

- 18. The single chip IC according to Claim 17, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 19. The single chip IC according to Claim 16, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 20. The single chip IC of Claim 13 wherein the magnetic core comprises an array of magnetic element bars within the magnetic core.
- 21. The single chip IC according to Claim 20, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 22. The single chip IC according to Claim 13, further comprising a film of magnetic material located at at least one end of the stacked planar coils.
- 23. The single chip IC of Claim 13 wherein the inductor has a footprint dimension of about $75\mu m \times 75\mu m$ or less.

- 24. The single chip IC of Claim 13 wherein the inductor is a 10nH inductor with a footprint dimension of $25\mu m$ x $25\mu m$ in a $0.18\mu m$ six layer metal interconnect copper CMOS technology.
- 25. The single chip IC of Claim 15 wherein the electrically conductive and magnetic via material issued for all vias on the IC.
- 26. The single chip IC of Claim 13 wherein the IC is an RF IC.
- 27. The single chip IC of Claim 13 wherein the IC is a System on Chip IC.